Approximately Propagation Complete and Approximately Conflict Propagating SAT Encoding Computation MaxSAT Benchmarks

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I. Description

This benchmark set contains MaxSAT instances that encode the problem of finding approximately propagation complete and approximately conflict propagating conjunctive normal form (CNF) encodings for a couple of interesting constraints. The approach for reducing this problem to MaxSAT is explained in a paper [1] to be published at the 21^{st} International Conference on Theory and Applications of Satisfiability Testing (SAT 2018).

The benchmark set is based the experimental evaluation of the paper mentioned above, where constraint encodings for the propagation quality tuples (∞, ∞), $(1, \infty)$, $(2, \infty)$, $(3, \infty)$, $(3, 3)$, and $(\infty, 1)$ are computed. The meaning of these tuples is also mentioned in the said paper.

To keep the benchmark set small, a couple of benchmarks for which both the solvers `LMHS` [2] (in the version from March 2018) and `maxino-2015-k16` [3] both need less than 3 seconds of solving time on a moderately modern computer (using an Intel(R) Core(TM) i5-4200U CPU with a 1.60 GHz clock rate) have been removed. Furthermore, MaxSAT instances whose computation takes more than 30 minutes on the said computer are also left out.

The benchmark file names contain:

- the name of the constraint that is to be encoded into conjunctive normal form, and
- the propagation quality tuple, where the elements are concatenated and ∞ elements are replaced by "`99`".

Some of the constraints to be encoded into CNF are taken from the set of examples supplied with the GenPCE tool by Brain et al. [4]. That tool computes propagation complete CNF encodings of constraints.

The program to compute the MaxSAT benchmarks is available at https://github.com/progirep/optic in the branch "`MaxSATEvaluationBenchmarkGeneration`".

References

[1] R. Ehlers and F. Palau Romero, "Approximately propagation complete and conflict propagating constraint encodings," in *21^{st} International Conference on Theory and Applications of Satisfiability Testing (SAT)*, 2018, accepted paper.

[2] P. Saikko, J. Berg, and M. Järvisalo, "LMHS: A SAT-IP hybrid MaxSAT solver," in *Theory and Applications of Satisfiability Testing - SAT 2016 - 19th International Conference, Bordeaux, France, July 5-8, 2016*, 2016, pp. 539–546.

[3] M. Alviano, C. Dodaro, and F. Ricca, "A MaxSAT algorithm using cardinality constraints of bounded size," in *Twenty-Fourth International Joint Conference on Artificial Intelligence, IJCAI 2015, Buenos Aires, Argentina, July 25-31, 2015*, 2015, pp. 2677–2683.

[4] M. Brain, L. Hadarean, D. Kroening, and R. Martins, "Automatic generation of propagation complete SAT encodings," in *Verification, Model Checking, and Abstract Interpretation - 17th International Conference, VMCAI 2016, St. Petersburg, FL, USA, January 17-19, 2016*, 2016, pp. 536–556.